A STUDY OF ALFALFA SEED PRODUCTION IN EAST-CENTRAL ILLINOIS

BY

SHELDEN FELDMAN

B.S., University of Illinois, 1948
M.S., University of Illinois, 1949

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN AGRONOMY
IN THE GRADUATE COLLEGE OF THE
UNIVERSITY OF ILLINOIS, 1952

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Production of the seed of alfalfa, *Medecago sativa* is an enterprise of large importance in the United States. The acreage of alfalfa grown for hay has increased considerably in recent years, but according to Agricultural Statistics, 1950, alfalfa seed production has not kept pace with the increase in alfalfa hay production (4).

Illinois harvested 852,000 acres of alfalfa hay in 1950 as compared to 396,000 acres in 1938 (1,2). The increase of acreage has been fairly steady from 1938 to 1950. With continued emphasis by the Agricultural Extension Service to encourage a larger use of grasses and legumes on Illinois farms, it is expected that alfalfa will maintain this rate of increase for some time.

It is proper in a situation of this kind to consider whether or not the Illinois farmer should attempt to produce his own alfalfa seed. Until now there is no record of alfalfa seed production in Illinois. Isolated cases are known of alfalfa seed being produced, but it is still a very minor farm crop. The writer suggests that in seasons prior to the time when alfalfa is to be plowed under, and when environmental conditions have permitted a good set of seed, that an alfalfa seed crop be harvested. But the set of alfalfa seed does not occur often in Illinois. It is the purpose of this paper to report the results of an investigation which was undertaken to study the factors which relate to alfalfa seed production in Illinois.

The effects of various environmental factors upon alfalfa seed production have long been the subject of investigation. It is generally believed that the chief requirements for a good seed crop are: (a) fertile soil, (b) the presence of an abundance of pollinating insects during blooming, (c) absence of harmful insects, (d) bright sunny weather during blooming and harvest periods, and (e) careful management. Many of

these requirements are not regularly provided in the East and Mid-West. Alfalfa seed is produced extensively in the semi-arid regions of the West and Northwest when pollinating insects are present. The conditions mentioned can be obtained in the semi-arid regions especially where irrigation is practiced Nevertheless, some seed is produced in the more humid regions but the same conditions mentioned above must be met to obtain a successful seed crop.

Generally the most favorable time to harvest alfalfa seed at Urbana is during the first week of September. This state with an area of 56,663 equare miles, and a north to south length of about 385 miles, has considerable variation in climate (3). For this reason the best harvesting time in Illinois varies considerably.

In addition to weather, the question of what crop to leave for seed has to be considered. The time of clipping hay is related to the pollinating insects and attack by harmful insects, soil fertility, length of growing season, and management. The average length of growing season in Illinois varies from about 150 days in the northern part of the state to about 200 days in the southern part (2).

This investigation was designed to study the response of alfalfa to the time and number of clipping of hay, length of growing season, climatic conditions, soil fertility, and management as these relate to seed production in east-central Illinois.

Discussion Of Results And Summary

In the study of the influence of number and the time of clipping of alfalfa plants upon seed production the clippings were cured into hay. It was found that there was a steady increase in the production of hay during the early part of the season, followed by a tendency to increase less rapidly as the season advanced. In other words, hay yields tended to follow the normal growth curve. It was observed that the area clipped on May 15 yielded .7118 ton of dry matter per acre.

The second clipping of this area on June 15 yielded .8188 ton of dry matter per acre making a total for the two cuttings of 1.5306 tons. The area clipped first on June 5 yielded 1.7864 tons of dry matter per acre and an additional .8089 ton of dry matter per acre when clipped again on June 29, made a total of 2.5953 tons for both cuttings. Part of the plots that were first clipped on June 5 was clipped a second time on July 14 resulting in a yield of 1.1482 tons per acre which when added to the yield on June 5 made a total of 2.9346 tons an acre. These results suggest that clipping the first crop on May 15 was detrimental to the succeeding crop. This is indicated by the fact that the yield of the first crop hay cut on June 5 was greater than the yield of the combined first and second crops cut on May 15, respectively.

The clipping treatments did not result in seed yields that were significantly different from one another. The low seed yields are believed to be due to unfavorable weather conditions during 1950.

Clipping may be expected to increase the number of seed producing stems, which in turn would mean a greater quantity of seed produced, all other conditions affecting alfalfa seed production permitting. Clipping at different dates may be expected to exercise control over plant development and thus enable the grower to bring his crop up to flowering at a time when the climatic conditions would be most favorable for the process of fertilization and seed development. This did not work out in this experiment because there was no period during the summer which was conducive to fertilization and seed development.

The year 1950 was not conducive to alfalfa seed production because during July and August, though the monthly mean temperature fell somewhat below 80°F, the realtive humidity was always above 50%, rainfall was high, and there was a lack of sunny weather.

In an experiment involving the growing of alfalfa in soil to which was mixed 15, 25 and 50% of sand seed yields were

obtained. The regression equation showed that seed yields decreased as the sand content of the soil increased. The writer believes that the decrease in seed yield was not due to the sand as such, but due to the lower soil moisture retentive capacity of the soils which contained the larger percentage of sand. Generally, in the alfalfa seed production areas of the United States the soil texture is sandy and the alfalfa is irrigated for vegetative development. When seed production is desired irrigation is stopped completely or greatly reduced to promote flowering, fertilization and seed development.

In a study of the relationship between soil fertilization with nitrogen and phosphorus, and alfalfa seed production no statistically significant differences due to soil treatments were found. Actually, there was no seed produced. Perhaps the most important factor working against seed set during 1951 was the unfavorable climatic conditions; namely, extremely high atmospheric humidity, excessive rainfall, and lack of sunny weather. Though there was a lack of statistically significant differences in seed yield due to soil treatments there was an increase in forage yields when phosphorus was included in the treatment, compared to the basic treatment. This experiment showed statistically significant differences in amount of forage produced. This was true of pot cultures in the greenhouse as well as in field experiments. Generally, when the soil is low in available phosphorus legumes respond to phosphorus fertilizer applications, by an increase in the yield of hay and also by an increase in the phosphorus content of the forage (5). According to analyses made by Snider (26) a ton of alfalfa hay contains 3.6 pounds of phosphorus (.18%). The soil uesd in the experiment tested low in available phosphorus (12 pounds per acre). With this low soil test for phosphorus, it seems clearly evident that the addition of phosphorus was responsible for the statistically significant increase in forage yield obtained. It is probably that since the soil was low in available phosphorus, the insufficient amount of phosphorus might have been the factor which would have limited the production of a successful seed crop, even if the climatic

conditions had been favorable.

In studying the relationship between the time of clipping alfalfa and seed production in 1951 it was observed that there were two main reasons for the low seed yields; namely, weeds and adverse weather conditions during the summer. The 1951 summer was conducive to weed growth since there was ample moisture all summer long. The extensive growth of weeds badly overtopped the alfalfa. All the clipping treatments, including the no clipping treatment, were over-run alike by weeds. No difference between plots could be detected in the amount of weed growth.

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VITA

Shelden Feldman was born in Warsaw, Poland, October 13, 1921 and moved to Rock Island, Illinois in 1922. He attended the William Penn Grammar School and Crane Technical High School, Chicago, Illinois, from which he was graduated, June, 1939.

In June, 1939, he entered the National Farm School, Farm School Pennsylvania, graduating with a diploma in March, 1942. At that time he went to work on a dairy and poultry farm in New Jersey.

He served in the infantry of the United States Army from October, 1942 to February, 1946. During that period he had the opportunity to study engineering under the ASTP program at Ohio State University from June, 1943 to March, 1944. After World War II was over, he attended American Shrivenham University, Shrivenham, England for one semester studying Agriculture.

He entered the University of Illinois June, 1946, graduating with the degree of Bachelor of Science in Agriculture February, 1948. He enrolled in the Graduate College of the University of Illinois and received the degree of master of Science in Dairy Science, June 1949.

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